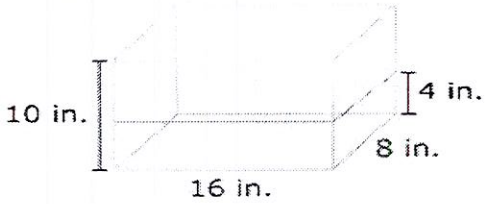
Part A

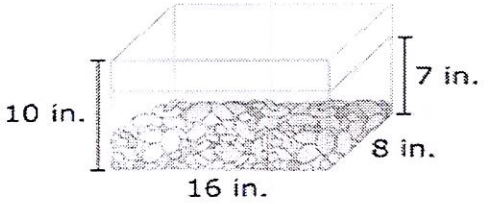
Moira collected some stones at the beach. Now she wants to make a clear plastic container to display the stones. To plan the container, Moira decides that she must first find the volume of the stones.

Moira has an aquarium that is shaped like a rectangular prism. It is 8 inches wide, 16 inches long, and 10 inches high. She plans to use the aquarium to find the volume of the stones.

First, Moira pours some water into the aquarium. She measures and finds that the water reaches to a height of 4 inches.



Then Moira puts the stones in the aquarium. She measures and finds that the water reaches to a new height of 7 inches.



Using this information, find the volume of the stones. Show your work.

Enter your answer and show your work in the space provided.

The height of the water ↑ by 3 in.

3 in. × 8 in × 16 in. = 384 in^3

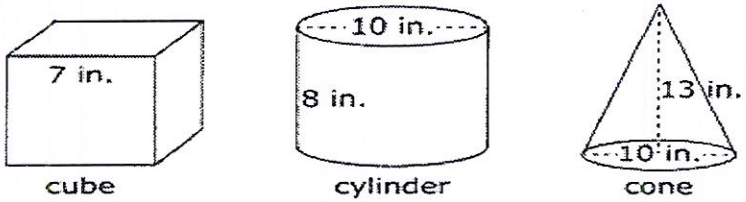
- Math symbols
- Relations
- Geometry
- Groups
- Trigonometry
- Statistics
- Greek

INTRODUCTION TO AREA AND VOLUME

ANSWER KEY

Part B

Moira is considering three possible shapes for the container that will hold the stones. The shapes are shown.



Find the volume of **each** shape. Show your work.

Enter your answer and show your work in the space provided.

Cube = $(7in)^3$ = $343in^3$

Cylinder = $\pi(5in)^2 \cdot 8in = 628in^3$

Cone = $\frac{1}{3}\pi(5in)^2 \cdot 13in = 340\ in^3$

- Math symbols
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Part C

Based on Parts A and B, which of the three shapes would be Moira's **best** choice for a container for the stones? Explain your answer.

Enter your answer and your explanation in the space provided.

The cylinder b/c this is the only container with a volume greater than that of the stones.

- Math symbols
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15. The table shows the approximate measurements of the Great Pyramid of Giza in Egypt and the Pyramid of Kukulcan in Mexico.

Pyramid	Height (meters)	Area of Base (square meters)
Great Pyramid of Giza	147	52,900
Pyramid of Kukulcan	30	3,025

Approximately what is the difference between the volume of the Great Pyramid of Giza and the volume of the Pyramid of Kukulcan?

A. 1,945,000 cubic meters

B. 2,562,000 cubic meters

C. 5,835,000 cubic meters

D. 7,686,000 cubic meters

$\text{Giza} = \frac{1}{3}(52900\text{m}^2)(147\text{m})$

$= 2{,}592{,}100\text{m}^3$

$\text{Kukulcan} = \frac{1}{3}(3{,}025\text{m}^2)(30\text{m})$

$= 30{,}250\text{m}^3$

GO ON ▶

Use the information provided to answer Part A and Part B for question 20.

A steel pipe in the shape of a right circular cylinder is used for drainage under a road. The length of the pipe is 12 feet and its diameter is 36 inches. The pipe is open at both ends.

3 ft.

20. Part A

Surface area of pipe = area of rectangle formula (b·h)

How many square feet of steel is the outer surface of the pipe?

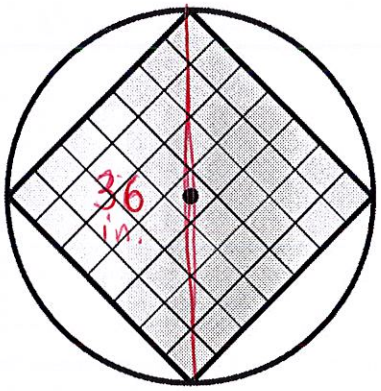
circumference of the pipe × length

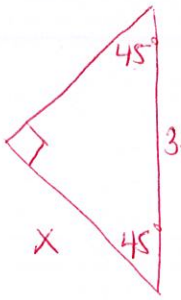
Give your answer to the nearest integer. Enter a number in the answer box.

$(3\pi ft)(12ft) = 113.ft^2$

Part B

A wire screen in the shape of a square is attached at one end of the pipe to allow water to flow through but to keep animals from getting inside the pipe. The length of the diagonals of the screen are equal to the diameter of the pipe. The figure represents the placement of the screen at the end of the pipe.





$\sin 45° = \frac{x}{36}$

$x = 25.4558$

This is one side of the square.

What are the perimeter and area of the screen?

A. The perimeter of the screen is approximately 72 inches, and the area of the screen is 324 square inches.

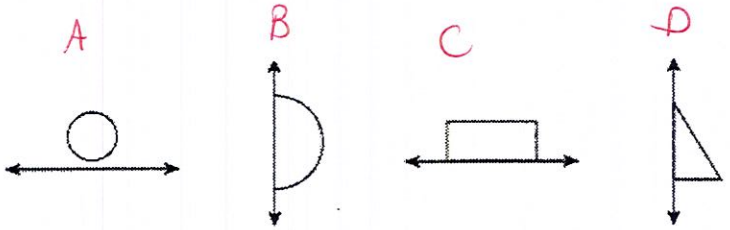
B. The perimeter of the screen is approximately 72 inches, and the area of the screen is 648 square inches.

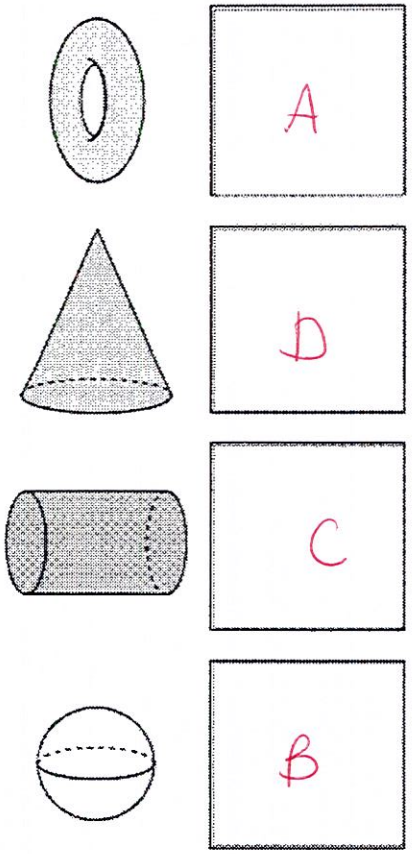
C. The perimeter of the screen is approximately 102 inches, and the area of the screen is 648 square inches.

D. The perimeter of the screen is approximately 125 inches, and the area of the screen is 1,018 square inches.

11. Each of the two-dimensional figures shown will be rotated 360° about the respective line, creating a three-dimensional figure.

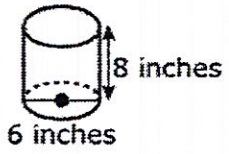
Drag the appropriate two-dimensional figure to identify the correct representation of the resulting three-dimensional figure.



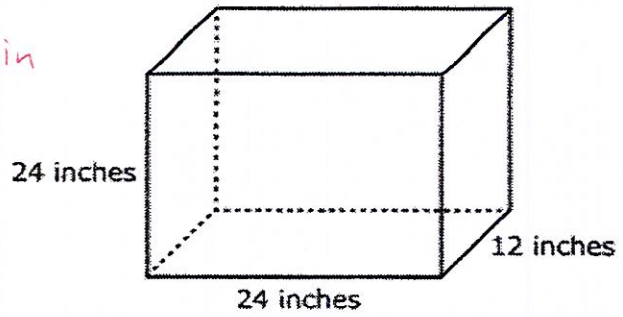


15. The given cylindrical container is used to fill the rectangular prism fish tank with water.

Volume = $\pi(3in)^2 \cdot 8in$



$226.08\ in^3$



Volume = $24in \times 24in \times 12in$

$= 6,912in^3$

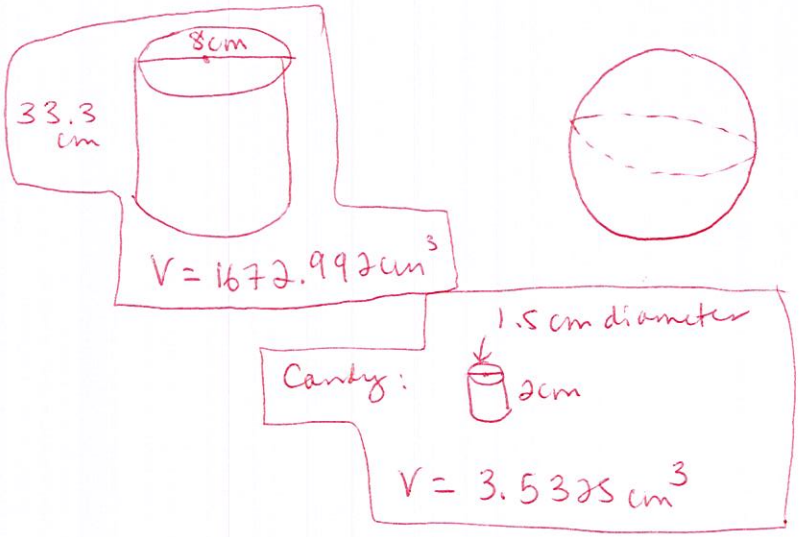
What is the **least** number of full cylindrical containers needed to completely fill the fish tank?

Enter your answer in the box.

$6912 \div 226.08 = 30.6$

31 containers

22. Hank is putting jelly candies into two containers. One container is a cylindrical jar with a height of 33.3 centimeters and a diameter of 8 centimeters. The other container is spherical. Hank determines that the candies are cylindrical in shape and that each candy has a height of 2 centimeters and a diameter of 1.5 centimeters. He also determines that air will take up 20% of the volume of the containers. The rest of the space will be taken up by the candies.



Part C

(260)(3.5325cm³) = 918.45cm³ (volume for 260 candies)

(0.80)x = 918.45

x = 1,148.0625 cm³

This is the total volume of the sphere.

1,148.0625 = $\frac{4}{3}\pi r^3$

r^3 = 274.21875

$r = \sqrt[3]{274.21875}$

r = 6.5 cm

Part A

After Hank fills the cylindrical jar with candies, what will be the volume, in cubic centimeters, of the air in the cylindrical jar? Round your answer to the nearest whole cubic centimeter.

Enter your answer in the box.

335 (or 334)

Part B

What is the maximum number of candies that will fit in the cylindrical jar?

Enter your answer in the box.

378

Part C

The spherical container can hold a maximum of 260 candies. Approximate the length of the radius, in centimeters, of the spherical container. Round your answer to the nearest tenth.

Enter your answer in the box.

6.5 (or 6.4)

Part D

Hank is filling the cylindrical container using bags of candy that have a volume of 150 cubic centimeters. Air takes up 10% of the volume of each bag, and the rest of the volume is taken up by candy. How many bags of candy are needed to fill the cylindrical container with 260 candies?

Enter your answer in the box.

7

Bags of candy = 15 cm³ of air, 135 cm³ of candy

135 cm³ ÷ 3.5325 cm³

38.22 candies per bag

6.8 bags → 7 whole bags